Space Weather Forecast

Issued on Saturday, 29 July 2023 at 13:29 Local

This forecast provides a four day assessment of space weather events. The probabilities stated below are for reaching or exceeding the given levels. For more information about space weather impacts please see the Met Office Space Weather Scales https://www.metoffice.gov.uk/weather/learn-about/space-weather/uk-scales

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Space Weather Forecast Headline: R1-R2 Blackouts likely throughout. G1-G2 Minor/Moderate storms possible day 4 (01 Aug) with CME arrival. S2/Moderate Radiation Storm only gradually easing.

Analysis of Space Weather Activity over past 24 hours

Solar Activity: Moderate with one Moderate flare observed from an active region that had rotated over the northwest limb. The most active region of the eleven on the disc was a developing spot in the southeast, with a recent common class flare, but this region remains hard to assess due to its location. The other regions of interest include a moderate sized spot in the centre southern disc that has seen a proliferation of smaller spots to its north, and another larger region in the northeast that has also seen some small growth beyond its main leader spot. Activity from just over the northeast limb also suggests a further region is due to rotate onto the visible disc. The other regions remain smaller and simple, with no significant growth.

One Earth-directed coronal mass ejection (CME) was observed. This was from the eruption of a line of material on the Sun's northeast disc, a "filament", which ejected its material on the evening of 28 Jul. No other Earth-directed CMEs have been observed.

Solar Wind / Geomagnetic Activity: The solar wind has been at mainly background levels. Total magnetic field strength has been weak, with the north-south component also varying weakly, but with some sustained negative (southward) periods. Total geomagnetic activity was Quiet to Unsettled (Kp 1-3).

Energetic Particles / Solar Radiation: The observed count rate of energetic particles (high energy protons) rose due to the energetic far-sided eruption, above the S1 level by 28/2350 UTC and peaking at S2 Moderate Radiation storm levels after 29/0530 UTC. These S2 levels have persisted since.

Four-Day Space Weather Forecast Summary

Solar Activity: Mainly Moderate activity is expected to continue with further Moderate class flares likely.

Solar Wind / Geomagnetic Activity: There is one Earth-directed CME from the large filament starting from 28/2021 UTC from the northeast disc. This is expected to arrive during the morning of day 4 (01 Aug). Otherwise mainly slow-wind conditions are expected with no significant enhancements indicated through the period. Mainly Quiet geomagnetic activity expected, with a chance of isolated Unsettled intervals. Activity likely increasing day 4 (01 Aug) to Active to G1 Minor Storm with the CME arrival, and a chance of G2 Moderate storm intervals.

Energetic Particles / Solar Radiation: The count rate of energetic particles is likely to remain above the S1 Minor Storm level for much of the period, showing only a gradual decline. A more notable decline is likely on day 4 (01 Aug) after the CME arrival.

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Geomagnetic Storms:

Geo-Magnetic Storm Probability (Exceedance)	Level	Past 24 Hours (Yes/No)	Day 1 (00-24 UTC) (%)	Day 2 (00-24 UTC) (%)	Day 3 (00-24 UTC) (%)	Day 4 (00-24 UTC) (%)
Minor or Moderate	G1 to G2	No	1	1	1	60
Strong	G3	No	1	1	1	10
Severe	G4	No	1	1	1	1
Extreme	G5	No	1	1	1	1

Radio Blackouts - X Ray Flares:

X Ray Flares Probability	Level	Past 24 Hours (Yes/No)	Day 1 (00-24 UTC) (%)	Day 2 (00-24 UTC) (%)	Day 3 (00-24 UTC) (%)	Day 4 (00-24 UTC) (%)
Active	R1-R2 M Class	Yes	70	70	60	60
Very Active	R3 to R5 X	No	5	5	5	5

Solar Radiation Storms - (High Energy Protons):

Radiation Storms Probability (Exceedance)	Level (cm^{-2} sr^{-1} s^{-1})	Past 24 Hours (Yes/No)	Day 1 (00-24 UTC) (%)	Day 2 (00-24 UTC) (%)	Day 3 (00-24 UTC) (%)	Day 4 (00-24 UTC) (%)
Active	≥ S1	Yes	100	95	75	60
Very Active	≥ S3 *	No	1	1	1	1

* S3 ≥ 10 MeV ≥ 1000 pfu and / or ≥ 50 MeV ≥ 10 pfu. (pfu = $cm^{-2}sr^{-1}s^{-1}$)

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